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AN ABSTRACT OF THE PROCEEDINGS  
OF THE CAMBRIDGE MEETING  
OF THE AMERICAN SOCIETY  
OF ICHTHYOLOGISTS  
AND HERPETOLOGISTS

The eighth annual meeting of the American Society of Ichthyologists and Herpetologists was held in the Museum of Comparative Zoölogy, Cambridge, on Friday, October 12, 1923.

The business meeting of the governors was called to order at 10 A. M., Vice-President Barbour in the chair. Present: Barbour, Dunn, Noble, Ortenburger and Wright.

Regrets from Eigenmann, Fowler, Nichols and Stejneger were read by the chair.

Dr. Afranio do Amaral, Mr. Chester B. Duryea and Mr. M. K. Brady were elected to membership.

Mr. Nichols having announced his intention of giving up the editorship of *Copeia*, the society decided to publish it as its official organ. E. R. Dunn was chosen editor.

The minutes of the last meeting and the report of the treasurer were read and approved.

The following officers were elected for the ensuing year:

President.....	J. T. Nichols
Vice-Presidents.....	A. H. Wright and
	C. H. Eigenmann
Secretary.....	E. R. Dunn
Treasurer.....	H. W. Fowler.

The place and time of the next meeting were discussed. It was decided to leave the matter to the discretion of the president.

The public meeting for the reading of papers then convened. After papers by Viosca (read by chair), Nichols (title only), Schmidt, Barbour and Amaral, the meeting took recess for an excellent luncheon at the Colonial Club. The afternoon session was taken up by papers by Dunn, Wright and Noble.

The meeting adjourned after a decision to publish the proceedings in a special issue of *Copeia*, to be edited by Dunn, and with a vote of thanks to the local committee.

E. R. DUNN

*Secretary*

## A CONTRIBUTION TO OUR KNOWLEDGE OF THE WATER SNAKES

While pursuing my studies in Louisiana herpetology, the members of no other genus have presented more perplexing problems than the water snakes. As is well known to all who have had experience with the group, this is due to their extreme variability. Some species, rather constant in one geographic region, may each exhibit a different phase in another. With some the range of variation is often very wide in any particular locality, but the series of phases assumed may be very different from the series assumed somewhere else. In at least one species the pattern and color even changes considerably with age, the changes in one region, however, differing from those characteristic of the same species in other regions.

In an attempt to establish a Louisiana check list I found the relationships of the water snakes so difficult to determine from literature that it has been necessary to undertake a comparative study of specimens from other localities before deciding certain questions of nomenclature. Thus far this work has been done only in a preliminary manner with comparatively few specimens. However, the work has shown that the time is ripe for a revision of the genus *Natrix*; until

this is done the water snake nomenclature found in check lists, herpetological papers and in museum collections will remain in utter confusion. I sincerely believe that the problems connected with the revising of such a widespread and complicated group will require the whole-hearted coöperation of herpetologists throughout the country, and a policy of isolation would surely lead to further insoluble mysteries. Fortunately, herpetology in America has now progressed beyond that stage.

If this paper will stimulate a discussion of the subject, and thus possibly aid in the bringing together of information or specimens, so that some one who has the time and training necessary to accomplish the ends sought can proceed with such a revision, it will have served its purpose.

In this paper I will confine my remarks to the following Louisiana species and such of their congeners of other regions as have come under my observation, trinomials being omitted for the sake of clearness, since relationships are not necessarily firmly established:

Natrix cyclopion  
Natrix rhombifera  
Natrix clarkii  
Natrix fasciatus  
Natrix erythrogaster.

I am convinced that there is a not too distant ancestor common to this subgeneric group, which should include, among the forms not indigenous to Louisiana, *sipedon*, *taxispilotus*, *transversa* and perhaps

one or two others. Theorizing, we may assume that this was a species which possessed dorsally six rows of alternating light and dark squares producing some sort of checkerboard effect, as upon this pattern all possible variations can be explained.

*Natrix cyclopion*: Widely distributed throughout the state, this is perhaps the most clearly recognizable species in the group. Although its dorsal pattern may vary from a unicolor to a barred phase somewhat suggestive of *taxispilotus*, the scalation around the eye always betrays its identity.

*Natrix rhombifera*: All of the well marked giant water snakes of Louisiana I would unhesitatingly call this species. It is found throughout the entire state, except in the coastal zone affected by salt water. East of us in Alabama, Loding refers Mobile County specimens to this species yet records no Alabama specimens of *taxispilotus*. I have seen specimens, exhibiting the "diamond back" pattern, taken as far east as Eureka, Florida. On the other hand, Brimley reports *taxispilotus* as common in eastern North Carolina, and Wright finds it common in southern Georgia, while the type specimens came from South Carolina and Georgia. The range of *taxispilotus* is given in the American check list as the Carolinas to Florida and west to Louisiana. The last locality is probably based on U.S.N.M. 12877 from New Orleans, which is labeled this species. The specimen has not yet come under my observation. I believe that if *taxispilotus* occurs in Louisiana, and is distinct from *rhombifera*, I could not have overlooked it among the thousands of snakes that have passed through my hands. I have,

however, observed in many specimens of *rhombifera* a tendency for some or even most of the dorsal spots to be disconnected from the lateral series. Wright and others have observed in *taxispilotus* from Georgia a tendency for some of the dorsal spots to be connected to the lateral ones by a narrow line.

Both *rhombifera* and *taxispilotus* have the same habits and habitats, that is open water courses, and their distribution is closely associated with southern coastal rivers, *rhombifera* extending in range farther inland along the Mississippi Valley. There are no geographical barriers separating them and the ecological conditions most suited to each are identical. Size is the same and even their more important structural differences may not be significant enough to be regarded as specific characters. In fact, I have noted in *rhombifera* a reduction with age of the relative size of the parietal plates. Little definite, however, can be said along these lines until a complete series can be more critically examined. I am inclined to believe, nevertheless, that the two will eventually prove to be phases of the same species, and intergrading forms will probably be turned up in Alabama or some nearby region.

*Natrix clarkii*: This snake is confined solely to the coastal strip, where it inhabits brackish marshes, disappearing completely when the water becomes permanently fresh. At the inner margin of its range it is found side by side with *N. fasciatus* and *N. cyclopion*. Until recently I considered *clarkii* a rare species and always found it typical and easily distinguished from the other species which encroach on

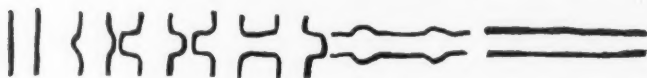
its habitat. In April, 1922, however, I collected a confusing typical specimen in the marsh in the southeast corner of St. Tammany Parish near the Rigolets Light, and during the Poydras Crevasse in June, 1922, I had an opportunity to examine several hundred specimens of *clarkii* which were secured southeast of New Orleans at the west end of Lake Lery in St. Bernard Parish, where they had been driven to levees by the high water, along with *cyclopion* and *fasciatus*. *Cyclopion* always retained its identity, but taken together the *fasciatus* and *clarkii* aggregate presented quite an unexpected problem, so I put aside a miscellaneous lot for study at my convenience.

I have collected *fasciatus* in many parts of this state and, although it is by far the most variable snake in Louisiana, I had never before seen it ever have a suggestion of longitudinal bands. Yet in the Lake Lery series the results of interbreeding seem evident. In studying 79 specimens, which I had set aside, I made an arbitrary division into groups, the lightest specimens being placed in one series and the very dark ones in another, while intermediates were placed in a third. It was interesting to note that in both *fasciatus* and *clarkii* red color on the sides or ventral portions is associated with the lighter phases and is totally obscured by black in the darkest phases. The pure *fasciatus* specimens, however varied in color, were next separated from the typical, longitudinally striped *clarkii* specimens, but there still remained a large group of intermediates. Those inclined to the transverse banded effect were placed in one lot and those in which the longitudinal effect pre-

dominated were placed in another. About ten of the intermediates were just about on the border between the two species. The following table illustrates the number of specimens placed in each group according to my judgment at the time.

	Typical Louisiana <i>fasciatus</i> patterns	<i>Fasciatus</i> with evident <i>clarkii</i> suggestions	Intermediate patterns	<i>Clarkii</i> with evident <i>fasciatus</i> suggestions	Typical <i>clarkii</i> pattern
Darkest Color Phases	5	1	1	1	2
Intermediate Color Phases	32	7	8	9	3
Lightest Color Phases	4	2	1	2	1

The transition from transverse to longitudinal banding is illustrated diagrammatically thus:



A study of a more complete series, including the young born in captivity, would indeed be an interesting problem, and no better subjects could be procured for a study of heredity phenomena.

*Natrix fasciatus*: This widely distributed and extremely variable Louisiana snake, except for the apparent geographically restricted intergrading with *clarkii* already described, can always be distinguished from the other water snakes of the state. Its most certain distinguishing character is the post-ocular light lateral

bands on the head, yet this may be occluded in some melanistic phases. One of its extremes here is a dark, almost uniform black form, in which the transverse light bands become very narrow, fewer, often oblique, and sometimes almost entirely obscured or obliterated. In this phase the number of transverse bands may be reduced to a dozen. In the dark phases the red markings may be almost or entirely obliterated by black. The other extreme is a very light phase in which 20 or more subcircular red brown saddles cross the back, these narrowing laterally into bands which, extending onto the belly, become bright red. The light brown hour-glass-shaped interspaces are relatively wide and red is very much in evidence on the side and especially the belly, where the black may be entirely obliterated. Between these two there seems to be almost every possible variation.

No matter what the color or pattern, there is always, in Louisiana at least, the irregularity and assymety characteristic of this subspecies and never any suggestion of the regularity of the dorsal pattern of *sipidon* or *transversa* or the immaculate ventral portion suggestive of *transversa* or *erythrogaster*. Neither is there ever any suggestion of the semicircular ventral spots of *sipidon*.

A brief glance at literature and at specimens which I have examined from other states indicates that, no matter how varied it may be, *fasciatus* seems to preserve its identity throughout a wide range. This appears to be a semicircular belt of coastal plain and alluvial formation touching the range of *sipidon* on three sides. *Sipidon* seems to belong to higher levels

and colder regions and apparently meets *fasciatus* on the east, south and west. Although it has not been determined definitely whether *fasciatus* and *sipedon* intergrade throughout the entire zone of contact of their ranges, I have viewed a number of intermediates from points in Virginia and North Carolina on the one side and Indiana and Illinois on the other, and it is evident that the two are closely related. The anterior asymmetry, so characteristic of *sipedon*, seems to have progressed, at least in some instances, toward the caudal end, the *fasciatus* phase being thus evolved.

*Natrix erythrogaster*: According to old records there have been found in Louisiana both *erythrogaster* and *transversa* which, when recognized at all, are still considered as phases of *sipedon* or *fasciatus*. Almost all specimens corresponding to *erythrogaster*, which I have taken in this state, had a yellow instead of a copper belly, however, and many were of large size, the largest individuals approaching the size of *rhombifera*. On the other hand, I had a series of small specimens which were typically like *transversa*. As the series grew, it became evident that the transversely banded specimens were the young of the larger unbanded species, and in September, 1922, I was rewarded with a brood of young from a four-foot individual, which cleared away all doubts.

No matter how confused the matter may be, it is clear from literature that large immaculate-bellied snakes are found throughout the ranges of both *sipedon* and *fasciatus*. North of the gulf coastal plain and east of a yet undetermined point in Texas or Arkansas the copper- or red-bellied form without

dorsal bands is found. In eastern Texas, Louisiana and extending at least to southern Alabama a similar but yellow-bellied form occurs. In central Texas the large yellow-bellied form is transversely banded throughout life, although obscurely so in large individuals.

This summer I collected a specimen at Indiana Mound, Louisiana, which had occasional salmon-pink pigment spots on the yellow gastrosteges, these becoming somewhat crowded just before the anal region, while the urosteges were immaculate salmon-pink. This I consider an intermediate, connecting the south Louisiana variety with the typical *erythrogaster*. A preserved specimen received from Monroe last spring was pale pinkish below when received but eventually faded to yellowish white. A medium-sized New Orleans specimen just collected exhibits orange-colored suggestions below, especially toward the sides. Although some links of evidence are still missing, there is sufficient to indicate that the Louisiana form, which loses its regular and symmetrical transverse bands rather early in life, gradually intergrades with the typical central Texas *transversa* which never completely loses its markings.

The question now arises: What has become of the young *erythrogaster* which seems to be known only from large specimens? The young of the Louisiana phase, being typically like young *transversa*, is suggestive of *sipedon*, except that the markings are regular and symmetrical throughout the entire length of the snake, and there are no semicircular ventral dark spots. As it grows older, the lighter markings become obs-

cured and at one stage only obscure whitish bands one scale wide can be seen crossing the back. Of all specimens of *erythrogaster* that I have seen the smallest one only, U.S.N. No. 9007, from Kinston, N. C., which is 29 inches long, shows a suggestion of dorsal light bands. These are paler than the ground color, faint but regular, and are one scale wide. The other markings, though faint, are otherwise as in an old *transversa*. It is probable, therefore, that the young of *erythrogaster* resembles the young of the Louisiana phase and is not red- or copper-bellied as is the adult. That being the case, it may be represented in the collections of the various museums but is probably masquerading under the name *sipedon*, in part of the range of which it should be found, thus adding to the confusion presented by this complex group.

Another matter cannot be overlooked. I have no doubt that Hallowell's type of *transversa* from Arkansas refers to this same species. It is not yet known whether the adult in that region is yellow- or red-bellied, and whether dorsally banded or not. It is not far north of the pinkish Monroe specimen and not far from Blanchard's copper-bellied specimens collected in west Tennessee and southeast Missouri. Besides, the type of *transversa*, being only 1 ft. 5½ inches, is well within the size in which the regular markings can be expected in any locality. Therefore, if adults from that section do not prove to be sufficiently different from *erythrogaster* to merit subspecific rank, the name *transversa* must be discarded, and the central Texas form will become known by Baird and Girard's name, *woodhousii*, which I consider a subspecies of *Natrix erythrogaster*,

the aggregate, which includes the Louisiana variety, being entitled to specific rank. A complete description of the Louisiana form of *erythrogaster* and further studies on the group I will reserve for a later paper. It must be noted that the young, being much like *sipedon*, shows the relation to the theoretical ancestor which is partly or completely obscured in the adult.

PERCY VIOSCA, Jr., M.S.

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## A POSSIBLY LITTLE KNOWN FISH FAUNA

Incidental to the ornithological work of the Whitney South Sea Expedition Mr. R. H. Beck has sent in a few fishes, two of which are described in the American Museum Novitates (1923, No. 94) as new genera.

There is always the possibility that these fishes may have been collected in the past, imperfectly described, or described in some obscure medium where the writer failed to find them. But there can be no doubt of their extreme rarity in collections and in the literature.

The chance of getting two entirely unknown fishes from a small incidental collection of but a dozen or so species, made in a fauna as well known as that of the Pacific Archipelagoes, would seem offhand very remote. These two were taken, one from the gullet of a tropic-bird, the other from the mouth of a tern, and preserved more from their ornithological than from any supposed ichthyological importance.

Turning the matter over in his mind, the writer has had the following thought: Is it not likely that a considerable unknown assemblage of small active fishes swims at the surface of the open sea? Such species might rarely approach the shore on account of competition with more littoral forms, and not appear in

collections made from the shore. On the other hand, they might be too small to be seen or taken on hook and line at sea, as are the dolphin and the oceanic bonito, and at the same time too large and active to be taken in a townet. Such fishes might be abundant and yet elude the naturalist, though a regular food supply of the birds that fish off shore.

The suggestion is made that systematic fishing at sea with a small mesh purse seine may yield results of much interest, even if the catch in number of individuals of fishes taken be small.

J. T. NICHOLS

*American Museum of Natural History, New York*

## NOTES ON CENTRAL AMERICAN CROCODILES

### ABSTRACT

Told of the rediscovery of *Crocodylus moreletii* at Belize and gave an account of my experiences, with Mr. Walters, in collecting specimens of *Crocodylus acutus* at Lake Ticamaya, Honduras.

KARL P. SCHMIDT

*Field Museum of Natural History, Chicago*

## AN HISTORIC CROCODILE SKULL

Last year Prof. Lyman told me that in an old letter his grandfather, Mr. Henry Russell, mentioned shooting a very large crocodile during his residence in Manila. The skull, he said, was brought to Boston. A search in the Boston Museum of Natural History enabled us to identify an old unlabelled skull as the one in question. This was done by a bullet mark on the palate which he mentioned. The skull is nearly 36 inches long and it is now almost a century since it was brought to Boston. Later it was discovered that in De la Gironière's *Twenty Years in the Philippines* (translation, Harper Bros., N. Y., 1854) there is a long and complete account of this giant reptile, which was apparently a local terror for many years. Its killing is graphically described. It was said to have been 29 feet long and 11 feet in girth, and it probably was. So far as can be learned this is the largest crocodile skull in existence.

Dr. THOMAS BARBOUR

*Museum of Comparative Zoölogy, Cambridge*

## EIGHT PAPERS SUMMARIZED

### 1. *On the Occurrence of Albinism in Coral Snakes*

Referred to the first case of albinism I have observed. The snake was a *Pseudoboa trigemina*, the black pigment of which was entirely absent all over the body.

### 2. *Two Cases of Albinism in Rattlesnakes*

Dealt with two albino specimens of *Crotalus terrificus*, one of them belonging to the collection of the Instituto de Butantan and the other to that of the Museum of Comparative Zoölogy. The first specimen was caught in the state of S. Paulo, Brazil; the second one, which was collected near Managua, Nicaragua, has been incorrectly described by Ditmars as a new species, *C. pulvis*.

### 3. *On the Evolution of Dorsal Markings in Bothrops jararacussu Lacerda, 1884*

Pointed out the changes which take place either in the principal system or in the accessory system of

markings of this species during its different evolutionary stages. These stages were divided in six. Having reached the last stage, the specimens evolve themselves into two different types: *melanic* and *xanthic*, which are completely different one from the other. This paper was based on the examination of 720 living specimens of *B. jararacussu*.

#### 4. On the Variation of Dorsal Markings in Three Brazilian Pit-Vipers

Was concerned with the species *Bothrops jararacussu*, *B. cotiara* and *B. alternata*. The knowledge of these variations will prevent people from describing new species which differ from the types only in different characteristics of the markings.

#### 5. On the Variation of Dorsal Markings in *Bothrops jararaca* (Wied, 1824)

In which eight different forms of marking were described as follows: 1st. constricted; 2nd. longitudinally divided; 3rd. transversely divided; 4th. transversely reduced and longitudinally elongated; 5th. longitudinally elongated and anastomosed; 6th. totally constricted; 7th. longitudinally elongated and narrowed; 8th. blended markings with the background color. I stated that the British specialists who certainly do not know these variations have erroneously considered *B. jararaca* as a synonym of *B. atrox*.

6. *Eight Brazilian Subspecies*  
*of Bothrops neuwiedii*

The races described were: *bahiensis*, *piauhyensis*, *goyazensis*, *minasensis*, *pauloensis*, *mattogrossensis*, *paranaensis* and *riograndensis*, which are found in eight different Brazilian States and are distinguished by their color and markings.

7. *On the Distinction of the Species Bothrops*  
*atrox* (L., 1754), *B.jararaca* (Wied, 1824)  
and *B.jararacussu* Lacerda, 1884

Criticized Boulenger, Procter and other herpetologists who think that these three species are synonymous. I based my study on about 6000 specimens (most of them living) which I have examined in Brazil and in the American collections. I pointed out that the three species can be distinguished from each other either by their markings, physiognomy, shape, scutellation of the top of the head, number of upper and lower labials, ventrals, characteristics of the hemipenis or by their venoms which have different toxic, haemolytic and proteolytic activities, or finally by the behavior of their venom in neutralization tests and of their serum in precipitin tests.

8. *New Genera and New Species*  
*of Snakes*

Related two new genera and fourteen new species of snakes which will be published in the Proceedings of the New England Zoölogy Club. The new genera are: *Platyinion* and *Heterorhachis* and the new species are *Drymobius rubriceps*, *Rhadinaea Brazili*, *Sordellina pauloensis*, *Paroxyrhopus atropurpureus*, *Platyinion lividum*, *Sibynomorphus Barbouri*, *S. Garbei*, *Heterorhachis poecilolepis*, *Bothrops erythromelas*, *B. Iglesiassi*, *B. pirajai*, *B. neglecta*, *B. leptura* and *B. andiana*.

AFRANIO DO AMARAL

## NOTES ON COLLECTING IN WESTERN PANAMA

Mr. C. B. Duryea and myself spent about two months in the field last summer for the Museum of Comparative Zoölogy. The Bocas del Toro plantations of the United Fruit Company served as a base of operations and our thanks are due to the superintendent, Mr. H. S. Blair, and to the many other officials of the company who helped us in the most cordial fashion. The difficulties of the terrain and the climate prevented any very extensive expeditions, but cloud forest was reached on Horqueta, and about ten days were spent at about 2000-feet altitude on the trail from Chiriquito to Boquete.

The collection of some 850 specimens is particularly rich in frogs, although four species of wormlike salamanders and two sorts of Coecilians were taken. Two peculiar ground Teiids were the most interesting lizards.

E. R. DUNN

*Smith College*

## TWO CLOSELY RELATED SPECIES OF PHYLLOBATES

*Phyllobates talamancae* was found to be very common in many localities in western Panama and adjacent Costa Rica, and on several different occasions was observed carrying tiny tadpoles on its back. At La Loma, on the trail from Chiriquicito to Boquete, at about 2000-feet altitude, a closely similar frog was found in company with *talamancae*, and had similar habits. In a small brook were found four sorts of tadpoles, two of which were *Hylas* and two *Phyllobates*. The two adults of *Phyllobates* were not distinguished in the field, but the two tadpoles were the extremes of the series of four. These two very different tadpoles transform into almost identical frogs. The most modified is the tadpole of *talamancae*, while the other is like the described tadpole of other species of *Phyllobates*. This remarkable example of larval diversity and adult similarity will be described and figured in the near future.

E. R. DUNN

*Smith College*

LIFE HISTORY OF THE MINK FROG

NO ABSTRACT

A. H. WRIGHT

*Cornell University*

OBSERVATIONS ON THE HABITS  
OF LOCAL AND EXOTIC  
AMPHIBIA

NO ABSTRACT

G. K. NOBLE

*American Museum of Natural History, New York*

## EDITORIAL NOTE

Due to exigencies of space, articles for publication in *Copeia* must be brief and restricted to observations on taxonomy, distribution, structure and habits. Controversy and opinion will rarely be printed. Authors will, as heretofore, pay for all cuts.

The practice will be continued of sending to contributors twenty-five free copies of the issues in which their articles appear.

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